DETAILED ACTION

This office action is a response to Applicant's amendment submitted April 4, 2008, wherein claims 6, 7, and 18 are amended and new claim 19 is added. Claims 1-19 are pending and are examined on the merits herein.

Applicant's amendment and remarks submitted April 4, 2008, are sufficient to remove the rejection of claims 5, 7, and 16-18 under 35 USC 112, second paragraph. "Pseudohalogen" is no longer recited in claims 5 and 7. Applicant's argument with respect to "non-solvent," in claims 16-18, is persuasive.

The following rejection of record is maintained and modified to include new claim 19:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nobuo et al. (JP 2002-003478, January 9, 2002, machine translation) and Swatloski et al. (WO 03/029329, April 10, 2003, PTO-1449 submitted August 29, 2006) in view of

Brandt et al. (Ullmann's Encyclopedia of Chemical Technology, Vol. 2, pp 221-234 (2001), PTO-1449 submitted December 5, 2006).

Nobuo et al. teach a method of modifying sugars and polysaccharides using an ionic liquid in combination with water sensitive reagents such as acid halides and acid anhydrides [0031]. Ionic liquids solubilize macromolecules and biopolymers [0001] and are known in the art; for example, ionic liquids comprising N-dialkyl imidazolium ion [0003].

Nobuo et al. do not teach the use of microwave irradiation and do not teach modifications of cellulose in particular.

Swatloski et al. teach the dissolution of cellulose in ionic liquids using microwave heating [page 19, first full paragraph]. Ionic liquids comprising chloride anions and imidazolium cations were most effective [page 29, last two paragraphs]. Exemplary ionic liquid cations, molten at a temperature of less than about 150°C [pages 10 and 11], include the cations shown in claims 5-7 of the instant application. Cellulose can be dissolved for derivatization [page 18, last sentence] and regenerated in a number of forms from the solution by mixing with water, ethanol, or acetone [page 28, first full paragraph].

Swatloski et al. do not teach etherification of cellulose.

Neither Nobuo et al. nor Swatloski et al. teach reaction conditions for the preparation of cellulose ethers.

Brandt et al. teach etherification of cellulose using R-X compounds such as methyl chloride or sodium chloroacetate, epoxides, acrylic compounds, or diazoalkanes

in the presence of OH^- [page 463, reaction equations]. In the case of lower alkyl chlorides or epoxides, the reaction is carried out in autoclaves at a pressure of about 3 MPa [page 467, 2.3].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to etherify cellulose using the ionic liquids taught by Nobuo et al. and Swatloski et al. in the presence of base and etherifying agents as taught by Brandt et al. Derivatization of polysaccharides using acid halides or acid anhydrides in ionic liquids is known in the art, as taught by Nobuo et al. The skilled artisan could have used the guidance provided by Swatloski et al. and Brandt et al. to optimize conditions for etherification of cellulose in ionic liquids.

Response to Arguments

Applicant argues that Nobuou teaches esterification, which requires different conditions than does etherification, and that Nobuou does not teach modification of cellulose. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Swatloski does not teach etherification of cellulose. Nobuou and Swatloski both teach derivatization of polysaccharides in ionic liquids. Swatloski teaches that cellulose can be dissolved and derivatized in ionic liquids.

Brandt teaches conditions for etherification of cellulose. Thus, the skilled artisan could use the conditions taught by Brandt for etherification of cellulose in ionic liquids.

Applicant argues that Swatloski does not teach separation of cellulose ether from the reaction mixture. Swatloski teaches separation of pure cellulose or derivatized cellulose; the skilled artisan would have a reasonable expectation of success for separating cellulose ether, which is derivatized cellulose, from the reaction mixture.

Applicant argues that base catalysts can depolymerize polymers such as cellulose. Brandt teaches that cellulose can be etherified using OH^-, which is a base catalyst and the same as which is instantly claimed. The skilled artisan could use the guidance provided by Brandt for etherification of cellulose, as discussed above.

Applicant argues that modification of Nobuou would result in changing the principle of operation as a reference and/or rendering the reference inoperable for its intended purpose. The focus of the Nobuou reference is solubilization of large molecules such as polysaccharides for derivatization. Although esterification is exemplified, it is not the central teaching of the reference. Thus, Applicant's argument is not persuasive.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAYLA BLAND whose telephone number is (571)272-9572. The examiner can normally be reached on Tuesday - Friday, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anna Jiang can be reached on (571) 272-0627. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shaojia Anna Jiang, Ph.D./
Supervisory Patent Examiner, Art Unit 1623

/Layla Bland/
Examiner, Art Unit 1623